



*To the Gentlemen Land-Owners in the Parts
of South-Holland, in the County of
Lincoln.*



IN Obedience to your Desire, by Letters directed to me at Rye, I have been lately down and taken a View of the present deficient Sew or Outfall of the Waters of the Level, called the *North Level* by way of the Shire-Drain, and the State of the Levels on each side from thence to the Sea. As also have Viewed and Examined the Nature of the Soil, and Length of the Way where a Canal is proposed to be cut from the Shire-Drain, near a Sluice there, call'd *Hill's Sluice*, down

to *Westmear-Creek*, from Letter A to B, in the Plan annex. And my humble Opinion on taking my Observations what may be depended to be the easiest in the Expence, and the most sure and effectual Remedy for procuring the common Benefit and Relief of the Country, according to your further Request, I shall as following lay down.

IN order whereto, shall first mention the Observations I made on my View of the Distress which the said respective Levels were then in, and have for a long date of Years been more or less liable unto, thro' the deficiency of all the Schemes and Methods of working, which have hitherto been proceeded on; and then will submit to Consideration what I shall propose; either for the restoring the Levels of the Country in general, or in particular for the discharging the Waters by way of the Outfall of the Shire-Drain, in a more sure and effectual manner than hath hitherto been.

AND, First, in taking my Observations on the 22d Day of *September* last, in company with several Gentlemen, whom I had the Honour to attend, I found the Waters of the *Thorney*, or *North Level*, in that part which I view'd going from *Guyborn* to *Clows-Cross*, to be on the Surface of the Land from about a Foot and a half deep, to half a Foot and less.

SECONDLY, I found the Water to be at the same time five Foot three Inches depth upon the Floor (or Apron) of the Sluice at *Clows-Cross*, where the Doors stood open, and the Water ran or settled outward into the Shire-Drain, but with very little difference of Level; and the Surface of the Water below the said Sluice contained within the Banks of the Drain, was then higher than the Surface of the Waters, lying on the Land upon the *Lincolnshire* side one Foot, and higher than the Surface of the Waters upon the Lands on the *Cambridgeshire* side one Foot eight Inches: And at the same time in the way going down the said Drain, by Observation found the Waters in some places to be near a Foot in depth, lying on the Surface of the Land upon the *Lincolnshire* side, and gradually in other

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places to be three or four Inches deep, and again in others quite dry; more particularly, for a considerable Extension above and below Squire *Trafford's* Seat, the Land being there of considerable height above the rest of the Levels. Also on the *Cambridgeshire* side some places were wholly dry, and in other parts the Grass growing thro' the Water for about two or three, to four or five Inches in depth.

THIRDLY, In sounding the depth of Water going down the Shire-Drain, I found it to be in the best of the Channel about five Foot depth, and to be nigh six Foot coming near *Tretton-bridge*, where I found the Channel by the Weeds and Sullage, &c. contracted in the breadth; and again in the way between *Hill's* Sluice and the Sluice next the Sea, called *Gunthorp* Sluice, in several places the depth in the best of the Channel less than five Foot, and for some length within the said *Gunthorp's* Sluice, there the depth full five Foot, and upon the Apron (or Floor) of the said Sluice five Foot four Inches.

FOURTHLY, In coming down the said Drain, I observed the Banks for near four Miles in the way below *Clows-Cross* to be but from about two, to between three and four Foot height above the Surface of the Water pent up in the Drain; and it appeared that there had been not long before in several low places an addition of Earth laid on the top of the Banks to raise them, and that in some parts the Water had run or drained over the Banks into the Levels, particularly on the *Lincolnshire* side. And was informed by the Gentlemen of the Country then present, that in *January* last was twelve Months the Water rose and kept up to such height in the *Thorny* Level, that it run over the top of the old Banks, and soaking thro' the addition of Earth, or Sod, that was raised upon them, endangered the overflowing all the low Levels (or Meadows) on either side.

THAT thereupon the Officers of the Honourable the Corporation of the *Bedford* Level set hands to work to dig down thro' a body of Sullage that had in the time of upwards of seven Years before been settled and raised without the Doors of the *Gunthorp* Sluice, at the lower end of the said Drain to upwards of ten Foot in depth; by means whereof there had been no Run or Discharge of any Water from all the *Thorny* Level for the said time, but what was dried up by the Exhalation of the Sun and the Winds; and that on the Fall of any considerable Rains the Levels on either side had frequently sustained damage by the Run and Soakage of the Waters upon them: But by the digging down a Canal thro' the said body of Sullage lodged at the Doors of the Sluice at C, into the Run of the Waters from the *Wisbich* Channel at D, the Surface of the Waters contained in the Shire-Drain was lower'd, and has since been kept down to the height above the Levels on either side, as before-mentioned.

IT is further necessary for the better understanding what (in a matter of so considerable moment) shall be hereafter laid down, here to take notice, that the Cause of the Silting, or Choaking up of the said Sluice for the fore-mentioned length of time, to the general distress of the Country has first been, that there is not the least natural Run at all of any Waters from the foresaid Level, called the *North* Level, but what happens by the fall of Rains and Soakage from Springs; on the contrary, it is often remarkable that the Inhabitants in times of dry Seasons are obliged to borrow Water for their Cattle out of the *Nean*, or *Wisbich* River, at a place called the *Dog* and *Doublet-Sluice*.

SECONDLY, That there never has been any proper Provision made or attempted to be made, that I could hear of, for the practice of any artificial Scour for the keeping open the Outfall in time of dry Seasons, by the borrowing of Water from the Sea; but so far have they been wanting



ing in Skill and Ability for the fixing any Sluice, or Sluices, to have that Effect, that even tho' they never have had any Sluice fixed with Draw-doors for the keeping up and letting off any Head of Water with any Fall, so as to tear up the Ground at the Foundation, yet the Sluices which by them have been made only for the Discharge of the common Run of Waters, particularly that at *Gunthorp*, has two or three times been blown up within Memory; and at this day, neither that, nor any other of the Sluices in all the Country, are sufficiently and properly secured, by any drift of Dove-tail Piles for that purpose.

THIRDLY, One thing more that hath caused the Choaking up of the said Drain for the length of time aforesaid, is, that in dry Seasons, when there is very little or no Run at all of any Waters from the Country, the Inhabitants frequently suffering for the want of Water; the Body of Sands, (or mixture of Clay and Sand) which extends from one Shore to the other above a Mile in breadth right against *Gunthorp's* Sluice, and six or seven Miles out into the Bay, ebbing dry at Low-water; have according to the direction of the Waves setting in from the Sea, with greater Force sometimes to one Shore than another, after once being bedded at the Tail of the Sluice, but to a little above the Surface of the Water pent up on the inside, been since from one Year to another gradually raised to the height before described.

AND this the more naturally happen'd, in that whilst the Outfall of the Shire-Drain became lost; the Run of the Freshes from the *Wisbich*-River the more easily took their Course to the opposite Shore; and the same Drought and Scarcity of Rains that gave opportunity for the bedding up of the Shire-Drain, consequently also decreasing the Body of Waters coming down by the discharge of the *Wisbich*-River, as the Scour outwards by the running off but thin, lost in its Weight and Power, thereby in hard Gales of Wind the Sullage driven inwards subsided, and lodg'd to that height in the Length from a good way below *Gunthorp's* Sluice up to the Town, that a Boat for several Years could not pass to or from the Ships riding about twelve Miles out in the Bay, excepting at the time of Spring-Tides. And altho' the Sands by the extraordinary Freshes that have happen'd within about thirteen or fourteen Months pass'd, have been worn down to at least two or three Foot better depth than (as I was inform'd) hath been known in several Years before; yet on taking my View with the Body of Gentlemen whom I attended, I found on the 23d of *September* last (being then Neap-Tides) that in the best of the Run of the Stream of the *Wisbich*-River, over-against the Outfall that lately was procured at *Gunthorp*, the Water went off in a considerable Breadth; but the Depth was there not above fourteen or fifteen Inches; and that the Tide did not there then rise or flow the least matter that could be discern'd, nor for near a Mile lower down: Whereas at the Extent of the Sands dry at Low-water about five or six Miles further to Sea, the Neap-Tides ordinarily flow thirteen or fourteen Foot right up and down; so great is the difference from the Low-water Mark at Sea, to the height of the Bar, still lying to the common discharge of the Freshes from the Country. And,

FOURTHLY, It is to be observed, That notwithstanding the opening of the Canal from *Gunthorp*-Sluice to the Run of the *Wisbich*-Stream; yet by means of the said height of Sands, the Waters within the Banks of the Shire-Drain at the time of making my View, remained standing and pent up to two foot height or upwards above the Soil or Surface of the adjacent Levels. Whereas, was the proper Depth from the Sluice to the Sea procured and maintained suitable to what the Apron or Floor of the same is fixed to, and the bottom and sides of the Drain between the two Sluices for the length to *Cloves-Cross* also kept sufficiently
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cleans'd ; the common Run of the Waters of the said Drain in their discharge from the Country might constantly be kept down to about three foot, or near it, lower than they were found on taking my View, unless in very great extremity of Weather in some Winter Seasons, the Waters might in some parts rise above the Surface, and only remain for a little while, as in other Meadows: which, is presumed, would prove satisfactory in the desired Benefit to all the adjacent Levels thereon depending. And the Effecting whereof, I shall therefore by two different Methods as following, lay down, with my Reasons for the same ; and Expence and Time thereto required.

AND that what I shall lay down may be the clearer apprehended, I shall observe, That it having appeared, that the late Run of Freshes which have happen'd, have worn down the Channel of the *Wisbich*-River to such better depth, as is before mentioned, than known for many Years before ; and thereby a Run obtain'd for the Outfall of the Shire-Drain, after being assisted by the Hands of Men by cutting of a Canal, tho' not fair with, but athwart the Run of the *Wisbich* Freshes to the Sea : And tho' the Run of the Waters from the said Drain have since (I mean to the time of my View) been but small, after once becoming upon the first opening thereof, equal (or near equal) with the Surface of the Run from *Wisbich* ; yet the said new-cut Canal is not become in the least silted up by any settling of Sands or Matter lodg'd therein near the Sluice, but on sounding the same at the time of my View, I found the Depth then to be for a good length without the Tail of the Sluice upwards of six Foot, and gradually to a lesser Depth, until coming to about a Foot or fifteen Inches upon being joined with the *Wisbich* Stream, which by reason of their open Breadth, run off but thin.

UPON Consideration of these known and indisputable Facts, what I shall propose for the procuring a more effectual and lasting Outfall, than hath by any Means or Endeavours hitherto used, been obtain'd, is,

FIRST, To cut a Canal from C, a little without the Outfall at the Tail of the *Gunthorp* Sluice, down under the *Lincolnshire* Shore, thro' the Salt-Marsh, or Foreland that has Grass growing upon it without the Walls or Banks of the Levels to Letter E, a little above *Watts's* House or the Place call'd the Wash-way, where the *Wisbich* Channel for a long time within Memory hath been known to have continued its Course ; and where notwithstanding, about three Yeats since, the Run of the *Wisbich*-Waters shifted to about a Mile distance towards the opposite Shore ; yet small Ships and Vessels at Spring-Tides still come up thither to lade and unlade their Goods, there being very near six Foot better depth of Water (at the time of making my View) than in the best of the Stream over the great Flat, or shifting Body of Sands opposite to *Gunthorp* : And it also is remarkable, that the general Body of Sands extending from one Shore to another right against the said Wash-way (or *Watts's* House) being accounted about three Miles over ; lie lower, or are full six Feet less height from the Surface of the Sea at Low-water than the height of the bedded Sands over-against *Gunthorp*, according to the best Judgment I could make by the Rise of the Tide, and the highest and lowest Parts reckon'd on a Medium.

ANOTHER Observation I shall mention, is, That in the length aforesaid from C to E, the Ground is of that height that it is only top'd by Spring-Tides ; and as it is remarkable that the Grass grows thereon, and that it is not liable to shift and wear as the *Wisbich*-Channel in the open Space of its Run is subject to ; and in the digging down the Canal, the better half of the Earth as dug up, being proposed to be laid on the Out-
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side at a convenient distance with a proper Slant for the Grass growing thereon to considerably greater height than the opposite Walls or Banks of the Levels; and a Pier to be built at the extent of the outward End to some Feet above the usual height of the Spring-Tides; and some Radling-work with Stakes and Brushwood also fixed on the Off-side, till coming some length within the End of the Pier, upon the present Grass-Land, the better to prevent any wearing of the new-laid Earth by the Drift of the Waves on Spring-Tides: It may greatly be depended, that if upon the late Opening of the Outfall at the Tail of *Gunthorp*-Sluice, when the Surface of the Water contained in the Shire-Drain lay but two Feet or less in height above the Surface of the *Wisbich*-Channel, more than what the same is now pent up to, the said Outfall or Cut thro' the Sands, hath ever since been kept open and maintained in its Depth (so far as till joining with the Run of the *Wisbich*-Stream) with abundantly less Force of any Run of Water from the Country; then, I think, it carries Demonstration, that a Scour or Head of Water to be let off from three or four times the height or difference of Level more than what was contained in the Shire-Drain before mentioned, and carried by a Canal not subject to the washing in of any Matter over the height of its Banks, must have the good Effect, let off at Low-water time, not only to keep open and maintain the same for the length to the Pier aforesaid, but likewise constantly to scour and deepen its Course down to the Low-water Mark at Sea.

SECONDLY, the outwardmost Sluice, which is proposed for the keeping up and letting off such repeated Heads of Water as from time to time shall be seen necessary, is proposed to be fixed not far from the Place of the present *Gunthorp*-Sluice, to be built with Tarras and Stone for Duration, and placed to some Feet better Depth, and of much better Breadth than that at *Gunthorp*: To be fixed both with Draw-doors for letting off such Scour as proposed, and with Swinging-Gates for Navigation in small flat-bottom'd Boats up the Country, drawing but a Foot or a Foot and a half of Water, if desir'd.

ANOTHER Sluice is also proposed to be fixed to about the like Depth, and with like Gates and Draw-doors, at, or near the Place of *Hill's* Sluice, whereby to stop and pen up such Head of Salt-Water as shall on the rise of the Tide be taken in at the outwardmost Sluice, from passing any further, or mingling with the fresh Water of the Country; to be built with the Materials aforesaid, and made perfectly Tight for that purpose; there being no Trees, or other growth that will take damage so far: And the Banks for the length between each Sluice, as proposed to be placed, being built of sufficient Strength and Height for taking in such Scour as shall be needful.

IT is likewise necessary to be observed, that tho' I have here mentioned the practice of Navigation by small Boats up the Country; in case of the same being embraced, proper Care ought to be taken that no Boats pass thro' the inward Sluice, but either at times when there is no Scour, or when a Scour is first let off, and the Waters of the Country appear to settle outwards, by which to prevent their being at all mingled with those that are salt.

THE Charge of cutting such proposed Canal, and the placing of such Sluices, I compute will amount to the Sums as follows.

FIRST, The length of the Canal I measur'd from C to E to be about two Miles; and upon trying the nature of the Soil in several Places, I found it stand better there than on the inside of the Walls or Banks of the Levels, and believe it practicable todig down the same to about the depth of seven or eight Feet, without letting off any Head of Water to assist in the carrying of the same deeper, proper Measures being taken to

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carry off any Springs or Soakage in the digging. To which greatest Depth, supposing the same to be dug by the Hands of Men to the Breadth of a hundred Feet at the Top; and to be left with a Slant or Batter of three Feet to every Foot in Depth on each side: The Breadth then at the said Depth of eight Feet (before the Scouring the same lower) will be 52 Feet; the Medium of which being 76 Feet, the same multiplied by the Depth, and again by $16\frac{1}{2}$, makes 10032 Cubical Feet of Earth in one Rod length; and divided by 324, the quantity of Earth contained in a Floor, which is what Diggers by the Great generally work by, the same will for each Rod length of the Canal be 31 Floors (or very near it); and if for the whole length of the Canal the number of Rods be so computed, the same will be 19816 Floors; the Digging of which, Wages of Men, Wheeling-Planks, Wheel-barrows, with other Tools and Necessaries included, reckon'd at 4 Shillings *per* Floor, will amount to 3963 Pounds 4 Shillings. And the further Charge of building a Pier before mention'd at the outwardmost End, with some Radling-Work, with Stakes and Brushwood, extended for some little way within the Pier: I believe may be about 800 or 1000 Pounds more.

SECONDLY, The Charge of fixing the two Sluices to be built as before propos'd, with hewn Stone and Tarras, or with Lime made with a sort of Marble-Limestone from *Dublin*, of the same Nature for Cementing in the Water and near equal in goodness with Tarras; and with Draw-doors for letting off Scours, and proper Hanging-Gates for Navigation up the Country: Together with the Expence of attending the necessary Scours to be made in the first opening the Canal, for the carrying the same to at least three or four Feet better Depth than before is mention'd; with some Assistance of Men, with Shovels and Drag-Harrows, to be used as shall be found necessary in carrying it to that Depth, and in the further Guidance of the Scours as let off in somewhat a fair Course to the Sea; I believe may be about 5000 Pounds more: To the making necessary Provision, and Men employ'd in the discharge of the Soakage of the Water that shall happen in the practice of digging down the Canal, with other contingent Charges, 500 or 1000 Pounds; making in all the Sum of 10963 Pounds 4 Shillings. This is the Expence I propose for two new Sluices being built with Tarras and Stone; but if upon laying dry the Foundations of those now standing, it should be found that both or either of them can be effectually repaired for the said two Uses described, so as to be of Duration without making others wholly new, the Sums will then be less.

NOW, what I would here beg leave to observe, is, that if the height of but two Feet Head of Water pent up in the Shire-Drain (more than at the time of my View) did, upon a Passage being open'd for it, by a Cut made athwart the Sands from *Gunthorp* Sluice to the Run of *Wisbich*-River, scour down such Cut, and a much inferiour Force of Water afterwards preserve and keep it open to the Depth that has been mention'd, till falling in with the Stream of the *Wisbich* Waters, setting over the great Flat in their way to the Sea.

AND if also it be true, that the Sands opposite to the said Sluice in the best of the *Wisbich* Stream do now (or did at the time of taking my View) lie full or near six Feet above the height of the Sands further down to Sea opposite to *Watts's* House: Then I think these two Observations carry Demonstration with them, that the quitting the said height of Sands, by a Canal cut down to the Place propos'd, secured by a Pier at the outward Extent, and repeated Heads of Water to be let off pent up by Sluices to a much greater height, than the height of the Waters before observed
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pent up in the Shire-Drain, must procure such Depth in the way to the Sea, that at such Tides when no Scour shall be made by the Sluices, either at times of the greatest or least Run of any Freshes, the Water shall always (when the Tide is down) be several Feet lower in the Run of the Canal without the Sluice than the Surface within the Shire-Drain; and also be found in ordinary wet Seasons not to run above a foot, or a foot and a half deep on the Apron of the outwardmost Sluice; and upon extraordinary Rains, when the Tide is down, not to run off to above twice the aforesaid Depth: and consequently so long as the said Shire-Drain shall be kept cleansed within its Banks, will always (unless very rare) be kept down to at least between two and three feet below the Height that the Surface was pent up to on the taking my View; and the effectual Draining of the Marshes of *Sutton Hundred* by the Outfall at *Derham's Drain*, which is now near being choaked up, be for ever secured and maintain'd.

BUT I cannot in Duty here omit to make mention of such Inconvenience, or Inconveniencies, as in some Degree cannot be denied to accompany this Method.

FIRST, That the Motion of the Sea on the Flux of the Tides setting in over the great Flat of Sands, or Sullage in the way to the Sluice, being generally (even in the stillest Weather) charged with some Particles of Sullage in the common running of the Tide, and consequently as in taking up a Bucket of Water, tho' seeming to be ever so clear, some Matter after a while standing will be found to subside; and as our wet Docks in *England* (altho' by the Practice of taking Ships in and out, the Body of Water is but very little changed) are known to Silt up: so the Heads of Water that will of necessity repeatedly be required to be borrowed from the Sea for making Scours, more particularly in Scarcity, or no Run of Freshes from the Country, will so far Bed and Silt up the length between the two Sluices, that will from one time to another require to be Cleans'd and Deepen'd; the performing of which in any effectual manner, must either be by Heads of Water let off for Scours by the Freshes from the Country, or by laying dry the space between the two Sluices, and carrying off the Sullage dug up by the Hands of Men to the Banks on each side; to lay which Space dry, to give Opportunity for Men to work, will only require the shutting down the Doors of the inward Sluice at about the first quarter Ebb, and the Water will run off to the Sea.

THE first of which Methods can only be practicable at Times when there are sufficient Freshes for it, to be pent up and let off by Draw-Doors from the upper Sluice; and they can then only be pent above in the Shire-Drain to about half of the depth, at which I found the Waters standing on the Apron of the Sluice at *Clows-Crofs* when I took my View, so as thereby not to annoy or spread on the Surface of the Meadows in *Tborney-Fen*; on which account they can be let off with no great power, as being pent but to a small height for it. And in the time of any continu'd dry Seasons, when Scours thro' the want of Freshes will principally be required, then such Method will not at all admit of being practised.

SECONDLY, The Employing Hands to clear away any Lodgment of Sullage, in manner, as aforesaid, will be tedious and chargeable in being repeated.

AND therefore what I would further here propose, as abundantly more ready and easy in the Practice to be depended on for ever; not only for the effectual Draining of the *North* or *Tborney* Level (principally here treated of) but also all the low Grounds of *Moulton*, *Whaploade*, *Hollbeck*, and Parts adjacent, extending on the *North-West* or *Lincolnshire* side of the *Nean* or *Wisbich* River; but of those too, that extend on the

opposite Shore, call'd the *Middle Level*, I shall as following lay down.

THE difference that there is in the height of the shifting Body of Sands athwart the great Flat over against *Gunthorp*, and opposite to the Wash-way (or *Watts's House*) has been before mentioned. And by Observation lately made by placing down one Spar at Low-Water Mark in the Sands at the outward part of the Run of the *Wisbich* Stream at Letter F in the Plan, with a Notch cut equal to the Surface of low Water in the Bay: A second notched in like manner placed in the Sands at the edge of the Run of the Stream opposite to *Westmear-Creek*: A third at the Wash-way: A fourth over against *Gunthorp's* Sluice: A fifth at Letter G, where a Dam a few Years since was attempted to be made, and a Canal a good way advanced in being cut: A sixth about the Mid-way too: And another (or a Notch cut in the Wharf) at the lower end of the Town: Again, one placed about the Half-way to, and another at *Guyborn* (at H) about four Miles above the Town; And other Notches in each of the said Spars or Sticks being likewise cut equal to the Surface of high Water-mark; upon computing the said respective Observations by the height of the highest Tide, on the flowing seventeen Feet perpendicular, or near, at the place of the outwardmost Spar, it flowed at the second thirteen Feet two Inches, at the third eleven Feet, at the fourth five Feet, at the fifth four Feet six Inches, at the sixth three Feet two Inches, at the lower end of the Town two Feet, at half way to *Guyborn* one Foot eight Inches, and at *Guyborn* but half an Inch.

BY which it is plain, that by means of the Sands or Sullage that Stops and Dams up the Waters in their Discharge from the Country, the Surface of the River at the Place of the last mentioned Observation was seventeen Feet, or within a few Inches higher than what the Surface of the Sea Ebbs to at Letter F near the Bay, which is reckoned but about the distance of fifteen Miles. Whereas in the *Thames* the River so far evidently keeps pace with the Ebbing and Flowing of the Sea, that the same Tide that flows twenty-three or twenty-four Feet at the Buoy of the *Nore*, flows fifteen or sixteen Feet perpendicular at *London-Bridge*, tho' the Distance of forty Miles. Likewise at the Mouth of *Boston* River, situated in the same Bay with *Wisbich*, and where the Sea consequently flows alike at the Mouth of one Outfall, as the other, up at the Town of *Boston*, being about five or six Miles from the outward extent of the Run of the River, the usual Spring Tides, notwithstanding the unhappiness of the same Drift of Sands at the Entrance, rise ten or twelve Feet at the Keys or Wharfs of the Town: That River being kept open to some considerable depth by the constant Body of Freshes, as to me related.

AGAIN, at the neighbouring Port of *Spalding*, the Sands and Sullage being lodged rather to a greater height than at the Outfall of *Wisbich*, the Surface of the Waters in the River are thereby known to be pent up in the Country above the usual Flux of the Sea, by which *Deeping-Fen*, and other adjacent Levels, are kept constantly, or the greatest part of the Year, several Feet under Water. And the same Misfortune in a great Measure attends the Levels bordering on the River *Ouse*: my Opinion of the only proper Means of restoring which Outfall to the Depth of about eight or ten Feet more than there is at present, I have by a former Writing explained.

TO be more particular in the Case of *Wisbich*, as the height of Sands and Sullage lodged in the Way to the Sea, has been occasion'd by the thin and open breadth of the Run of the Freshes, that takes off the Weight and Power of their ever grinding down their Passage deeper in meeting

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meeting the Waves of the Sea, which are still charged with fresh Particles of Matter that somewhere subside; so whilst the same Cause continues, must, in repeated dry Seasons still rather grow worse, and hath not only carry'd the evil Consequence with it, that the Outfall of those Sluices fixed at *Guyborn*, by which the Waters both of the Middle and *Tborny* Levels on each side the *Morton's* Leam formerly had their discharge to the Sea, is now become choaked up and lost: But too, in time of sudden Land-Floods, for want of a free and ready discharge, the Waters have risen so high on the Banks of the said Leam, that they have several times broke down the same, and deluged the Country on one side or the other; and notwithstanding any Outfall procured at *Gunthorp*, yet the same repeated Charge must still be required to keep up and maintain the said Banks to prevent the like unhappy Effects, unless the antient Outfall at *Guyborn* be also procured and maintain'd. I would here add a word, that the Method which I saw Men employ'd on in the Repairing of these Banks was very improper, both with regard to the Duration of the Service intended, and to the Expence in the Practice.

THE Remedy of all the Evils afore mentioned, which I would humbly propose, is, Intirely to quit the said Barr of Bedded-Sands below the Town, and to carry the United Waters of the County down under the *Lincolnshire* Shore by a Canal to be cut the length from Letter G to E, where to be finished with a Pier that I have mentioned: To be at least fifty Feet better breadth than before proposed, for the use of the Shire-Drain: To fix one Sluice below the present Sluice at *Gunthorp*, composed of the Materials for Duration afore said, to be placed to at least four or five Feet better Depth, and of Breadth as shall be approved for the Convenience of Navigation, as well as with necessary Draw-doors for Scours. A second Sluice to be placed where the best Foundation is found for it some way below the Town of *Wibich*, and a third a little above those Sluices that were formerly fixed at *Guyborn*.

THE digging of which Canal is proposed first to be begun from the outward End, whereby the better to carry off any Annoyance of Water which shall arise in the practice of the digging down the same: And after being dug to the Depth as permitted by the Annoyance of Soakage and Water, and the first Sluice fixed whilst the same is carrying on; then to open the Canal at either end, and any other Stops that may be made for draining off the Water in the practice of Digging; and thereon to close a Dam made a-crofs the present shallow Run of the Country Waters at Letter G, and to begin and make Scours to the Sea, in the Manner and with the Force before described: First, from the lowermost of the said two Sluices, assisted by Men, with Shovels and Dragg-Harrows for carrying the same at the first Opening to some Feet better depth than what shall be found practicable within a moderate Expence, to be wheeled upon the Banks.

AND when by Scours taken in on the Spring-Tides, or partly pent up by the Freshes, and let off at the time of Low-water, the part of the Canal next the Sea shall be brought to the Depth of the Floor (or Apron) of the first Sluice; then the Length from thence to the second Sluice to be laid dry on every Tide, when there is Weather and Day-light for Men to work, by shutting the Gates and Draw-doors as soon as the Tide is fallen below the Bed of the River; and when the Water shall be so stop'd by shutting down the Doors, Men to be employ'd to dig down the Sullage so low as convenient for the being wheel'd up upon the Banks or Sides, and then likewise to proceed and deepen the said Length by letting off Scours, as before is mentioned.

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WHICH, after performed in the way from the two lowermost Sluices to the Sea, then likewise to proceed and lay dry the Length to the upper Sluice at *Guyborn*, and Men to be employ'd to dig up and wheel off the greatest part of the Sullage bedded in the River, and the rest to be worn down by penning up the Freshes only; which being not subject to the Objections before stated by way of the Shire-Drain, here is practicable to be repeated without the borrowing any Water from the Sea, until the Bed of the River for this upper length be brought to as many Feet below the Surface of the Levels extending on either side the Banks of *Morton's Leam* as shall be necessary, and to satisfaction, for their being effectually drain'd by proper Sluices to be fixed in the said Banks, as shall thereon be thought fit, and appointed for the same.

FOR the better understanding of which, it is necessary here to observe, That in the Month of *May* last, the Surface of the Waters in the said River or Leam, at the Place of the former Sluices fixed in the Banks, were then found to be but fifteen or sixteen Inches above the Surface of the *Thorny Level*, being much lower than known in several Years before; which is rational to account to have happen'd by the extraordinary Run of the Freshes within five or six Months before, grinding down the Sands from thence to the Sea, which gave Occasion to the Opening the Outfall at *Gunthorp*. And on my observing the height of the Surface of the River, coming for *London* the 28th of *September* last, assisted by the Person who gave me the Information aforesaid, I then found the Surface of the Water contained in the River at the same place to be about three Feet above the Surface of the said Level. Again, upon the said Person's lately making Observation of the Flux of the Tide at the respective Places as before laid down, there being then and for some time before, a considerable Run of Freshes from the Country, which must have continued grinding down the Sands; the Account which the aforesaid Person (or his Brother) gives, is, that the Waters in the River opposite to *Guyborn* were then near six Feet above the Surface of the said Level.

SO that supposing the Bed of the River at the first opening the Canal, and letting off Scours, as before-mentioned, to be deepened at Letter G, about ten or twelve Feet, and opposite to *Guyborn* about six or eight Feet below what the same was at the time of my View, which will be a so much better and more immediate Outfall to the Sea; the Velocity of the Stream of the Freshes on the coming down of Land-Floods, will thereby extreamly be quicken'd, and sooner be run off than they at present can possibly be discharged over the height of the great Flat. And in Times when there are no considerable Land-floods (on the Depth of the River, as aforesaid procured) the Surface then at *Guyborn* will in ordinary Seasons consequently be kept down to at least three or four Feet below the common Surface, both of the *Thorney* and middle Level; and at all times whenever the Flux of the Tides shall be below such Surface of the River; namely, from about the first Quarter, or one third Ebb to two thirds Flood, will give constant Opportunity for Draining the Extent of Levels on either side, which are before named, upon Sluices being properly fixed of Dimensions for it; and the Shire-Drain being also open, will be a double Outfall for those of the *Lincolnshire* or *North-West* side of the River. I cannot but here take Notice that I have lately seen it erroneously expressed and complained in a publick Paper, that the Sea which used to Flow a good way up the *Morton's Leam*, and joined with the Land-Waters to return with a Force that scoured down the Channel, has retreated and left them: The Fact only is, that the Sullage brought in by the Sea has barred and keeps out the Tides, and by the Operation of Artificial Scours, as here proposed, the Tides must again have their Course with the same Flux and Reflux as formerly,

merly, and be useful in Navigation up the Country; especially if proper Gates be fixed to the upper Sluice for Vessels to pass by a Head of Water kept pent up for it in time of Neap-Tides, and in dry Seasons. One thing more that I would add, which carries Demonstration with it, is, That in lowering the Bed of the River, as here proposed, the Land-Floods, which by their now being pent up cause the Accidents of Deluging the Country before-mentioned, will, in all future Time be with greater Velocity discharged to the Sea; and consequently the Height and Expence in maintaining the Banks of the *Morton's* Leam, &c. be the less required.

AFTER these Points upon the first Use of the Sluices, as I have here described, shall be effected, which in case of any Doubtfulness arising, I shall be ready to undertake the doing of, and hope amongst my Friends that were bound for me at *Dagenham-Breach*, to give Security for the Performance (if such thing should be desired) then I think it may be admitted to carry Demonstration, that if such considerable Depths as proposed can be obtained in the first Practice, from the foresaid uppermost Sluice by Scours to be let off down to the Sea, the same may be depended to be maintain'd for ever with very small Expence, the Importance of the Service carry'd with it consider'd.

AND one Remark more for the strong Probability of such General Outfall being preserved and maintained this way, is, That as the present various Shiftings and Height of the Body of Sands in the open Space of their Extension from Letter G, down to the Low-Water Mark at Sea, is caused by two Powers; one the Force of the Freshes in time of Rains setting Outwards, and the other the constant Drift of the Waves Inwards; then upon the carrying the United Waters of the Country in a bounded Channel down under the *Lincolnshire* Shore to the Pier proposed; and one of the two Powers before named for such Length of the said open Space thereby ceasing, and the other, namely, the Setting in of the Sands, or mixture of Clay and Sands (being such as the Walls or Banks of the Levels are composed of) still continuing, and the Particles of Matter with which the Waves are charged daily subsiding where their Motion becomes easy, consequently as an Instance in a few Years appeared of the Sullage Bedding to a considerable height without the Sluice at *Guntborp*, whilst the Drain there ceased; so the Space from Letter G to Letter E, must in the gradual Operation of no very great length of Time become firm Land, and be of Value to be Embanked (or Walled in) from the Rise of the Tides. And so much of the said Body of the Sands or Matter which shall be Driven and Subside Inwards; so much of their Height and Extent must be lessened Outward to the Sea, and by it the better Depth from the Outfall proposed for the General Drain of the Country, with the more Ease of attending the Scours be always maintained, and abundantly less liable to any Shifting of the Sands, in the shortness of the Way to the Low-Water Mark in the Bay.

NEXT, As to the Expence of the Work for the Carrying the United Waters of the Country this Way, I shall now to the best of my Judgment Compute,

FIRST, The Charge of Digging a Canal by the Hands of Men at the Wages *per* Floor, which (from C to E) as before is Estimated, reckon'd at one half greater Breadth at the Top, will amount to 6570 *l.* 13 *s.* 4 *d.*

SECONDLY, The carrying the same to Letter G, being about half a Mile greater Length, will be 1642 *l.* 13 *s.* 4 *d.*

THIRDLY, The making of a Pier, with other Work mentioned, to secure the Outward Extent of the Canal from the Drift of the Waves setting Inwards, 1000 Pounds.

FOURTH-

FOURTHLY, The fixing of three Sluices for the Uses, and with the Materials before describ'd, together with the Digging down and Scouring the Depth of the River in the Length between the second and the upper Sluice fixed at *Guyborn*, not less than 10, or 12000 Pounds. To Contingent Charges, as before going Stated, 1000 or 1200 Pounds; making in all 22413 *l.* 6 *s.* 8 *d.* Next, as to the Time required for the Performance, I believe the same may be depended to be Effected in about two or three Years, upon due Application to it.

THUS having laid down my faithful Opinion of this Method for the general Advantages propos'd, I shall now mention my Thoughts of the Uses practicable to be procur'd, and the Expence probably required to carry a Canal for an Outfall at *Westmear* Creek; as from A to B in the Plan.

THE first Observation I shall make, is, That a Canal being suppos'd to be carry'd this way at the extream Breadth of the various Shiftings of the Run of the *Wisbich* Freshes, without having artificial Scours borrow'd from the Sea, must be liable to be Silted up, by the Drift of Sands and Sullage setting more directly and with more Power upon the Shore; and that there can be no other way of making the necessary Scours at this Place to keep the same open, but by at least the Number of two Sluices, as I have propos'd by continuance of the Outfall at the Shire-Drain; and as there can be no Head of Water taken in from the Sea, in times when there may be the most needful Occasion for it, but that some Sullage must be suppos'd to subside (where the Waters become quiet,) and likewise that there is no other preferable Way or Method of Cleansing the same than what I have mentioned in my Objections to the practice of taking in Water at *Gunthorp's*; therefore I think the same abundantly inferior too, and when performed, must be accompanied with far greater Trouble and Expence than in Case of carrying the United Waters of the Country down by the said Drain.*

SECONDLY, The Length of the said propos'd Canal being (according to the Information I have received) full four Miles and a quarter; the Charge of cutting the same to the Breadth of a hundred Feet at the Top, as in this Treatise computed (in case of carrying a Canal only from *Gunthorp's* to Letter E, near the Wash-way) will amount to 8432 Pounds; and the Purchase of the Land thro' which the same is to be cut, being upwards of three Miles and six Furlongs in length within the Bounds of the Walls or Banks of the Levels, and supposing 150 Feet be reckon'd on either side the Canal for laying the Earth on as dug up, with allowance for some Foreland, in case of the Sides sliding in; as upon trying the Nature of the Soil, I found there is strong Reason to suspect the Occasion for, as well as the Batter or Slant I have propos'd to be left on either Side on that account: The Purchase of the Land then required, computed at the breadth of twenty-four Rods and four Feet, and Length as aforesaid, containing 181 Acres (or little more) valued at twenty Years Purchase, to be worth Fifteen Shillings *per Acre per Annum* (the Fraction not regarded) will be 2715 Pounds. Further, the building two Piers, one on each side the End of this Canal, where the more heavy Waves will strike with greater Force than at the Place where I propose a Pier to be made; therefore with the other Work which I have before computed necessary thereto, each of such Piers may be reckoned at one half, or at least 200 Pounds greater Expence,

Note, That since the drawing this Report, I have received Information, that by the Alteration of the Sands this present Winter, the Channel of the Freshes which lately ran near to *Westmear* Creek, has shifted as far from the *Lincolnshire* Shore as it has done at *Gunthorp*.

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making 2400 Pounds. Also the building of two Sluices, with the Materials and Workmanship, as proposed at *Guntborp*, together with the Assistance of Men, with Shovels and Drag-harrows, in the bringing the Canal to a greater Depth after the Sluices are fixed, than first dug to, with an Engine and Trunk, or Trunks to be fixed, and Labour in the Discharge of the Soakage in digging down the Canal, with other Contingencies, at least 6000 *l.* making in all the Sum of 19547 Pounds.

THIS is the Charge (according to the Computation that I have made in the foregoing Proposals) which I believe requisite to the carrying an Outfall this way; and that must be attended with much greater Difficulty to maintain the same by repeated Scours (especially in dry Seasons) than required by my last mentioned Proposal, of conveying all the Waters of the Country in one Channel, for the greater Assistance of Nature.

BUT, if notwithstanding all that I have said, it should be resolved upon to have the Outfall carried down to *Westmear* Creek for the immediate Use of the Shire-Drain; it is then submitted, whether it would not be advisable to cut the Canal for such purpose from the Tail of *Guntborp's* Sluice, down through the Saltings without the Banks or Walls of the Levels, which would carry with it the particular Advantages that follow.

FIRST, The Length this way, according to a Plan to me delivered, by which that annex is principally taken; and by the Account of the Measurement I have received, is full half a mile less. Secondly, a Canal to be cut thro' the Marsh-Ground, will require to be dug to at least three or four Feet below the Depth of *St. James's* (or *Derham's*) Drain; and the Soil at that Depth being Sand (or the greatest part Sand) attended with a Soakage of Water, there is strong Reason to suspect, that the Expence of Artificial Means will be required to make the Sides stand in the digging, and to be afterwards maintained to the Depth that is necessary, without Accidents of Caveing and Sliding in; but without the Walls of the Levels, the Ground is preferable. Thirdly, by a Canal to be cut on the Outside, there will only be required the Purchasing of the Land for less than half a Mile length to go within the Banks near *Watts's* House, where the Sea runs close to the Shore. Fourthly, by a Canal carried this way, the common Advantages of Uniting the Run of Waters from the Country, may be embraced, whenever an Agreement to the Expence shall mutually be enter'd into.

I will beg leave to Conclude my Thoughts upon the Whole, that if the Three Benefits by my last Method proposed; namely, the Draining of all the Levels, both on the *North-West* and *South-East* side of *Wisbich* River, without the Expence of any Mill-work to be any more required, unless in such Parts lying below the General Surface of the Country, like that of *Soham-Meer*; with the Certainty of procuring the Navigation up to *Wisbich* for small Ships and Vessels of about 8 or 10 Feet Draught of Water to come up to the Town at Neap-Tides, and Ships drawing 12 or 14 Feet on the Spring-Tides, and on common Tides as far as the first Sluice. And if either of these Services may be deemed worthy the Expence that is proposed: Then it is submitted, whether according to the Proportion of Advantage that may be judged to arise, to each of the Levels and adjacent Parts I have mentioned; And the Benefit also that will follow in the Advantage to Trade, in the Dispatch and Convenience in the ready Loading and Unloading of Ships, up in the River, with far less Expence, with regard to all heavy Goods Imported and Exported; which must be found to extend in the Country as well as to the Town, and Comfort for ever to Seamen, in not being obliged to a long Attendance in the open Bay for the Assistance by small Boats, or Lighters, to Lade and Unlade, only on Spring-Tides: Whether then in Consideration of thus restoring the Harbour, the Town would not readily agree to Contribute some Share to the Work, either by a Duty on all Tunnage brought to and from the Town,

excepting by Boats or Lighters of the Burthen, and at Times as aforesaid ; for which a Gage may be set for those who refuse to pay, Equal to the Height of the Bedded Sullage on the great Flat, by a Mark on one of the Sluices in passing this Canal ; or in other manner as shall be thought fit and agreed.

THESE Points I only mention, and beg Leave to add, that as very considerable Profits of the great Levels of this Country have been towards 100 Years lost to the Proprietors and to the Publick, and must to all future Time still so continue ; unless an effectual Depth to the Sea thro' the Sullage Bedded in the Way of the respective Outfalls, be procured and maintain'd : and as there has been no Power of any Artificial Scours hitherto used for that Purpose, (which can only be proper for it :) Namely, by the Penning up Water by Sluices, which I conceive not to have been attempted, thro' the want of Judgment, in securing the Foundation of such Sluices by the Drift of Dove-tail Piles, neither the Sluices in this Country, nor at *Dover*, or *Rye*, or elsewhere in *England*, having been by such Method secured, until the Sluices which I made at *Dagenham* ; which being built each 36 Feet in Breadth, and the Depth of the Draw-doors 14 Feet, on drawing them wholly up on the Spring-Tides, having discharged the Waters setting out of the Levels in the Practice of stopping that Breach, with between seven and eight Feet difference of Level, or Fall, in the Run of about a hundred Feet ; being much greater than the Fall at *London-Bridge*, I hope may be deemed sufficient Proof of such Sluices being made Effectual.

ALSO another Instance I have shewn on a Sluice at *Dover*, which by the Water penetrating under the Foundation, thro' Defect in the Workmanship, lay many years useles ; but by the Drift of Dove-tail Piles, has since been render'd serviceable to the Publick, in letting off Scours at that Harbour. And if the whole *Bedford*, and other adjoining Levels to the Southward and to the Northward, be practicable to be drain'd, partly by the Outfall of *Lynn*, and the Navigation on that Side also greatly improved, in the Extent to the Country as well as to the Sea, I should account myself happy in being employ'd, in shewing a convincing Instance of it.

AND if (as I am inform'd) there are many low Parts of the said great Levels that are now deemed of so little Value, that it is practicable to purchase the Propriety of 1000 Acres for 1000 Shillings, or less, which would be worth at least 10, or 15 Shillings *per Acre per Annum* ; or 10, or 15000 Pounds, was the same drained : And if it be true, that the whole Levels afore said, computed to be upwards of 400000, or near 500000 Acres, were effectually drained, would then produce, one part with another, one half, or but one third greater Profits to the respective Proprietors than they do at present : Then it is submitted, whether it is not the immediate Interest of all the Proprietors of these EXTENSIVE LEVELS, to enter into a mutual Agreement to raise the Money for the Service among them ; when it may reasonably be presumed, that the Loss in every single Year's Delay, will be more than would pay the Charge of the whole Performance.

AS Works relating to Water have been the Business and Study of my Life ; in case of my being in any Particular, that I have here mentioned, not clearly understood, I should be very glad to have an Opportunity verbally to explain my Opinion in whatsoever I am commanded. And am,

GENTLEMEN,

London, February
25, 1727.



Your most Faithful, and

Most Obedient Servant,

J. Perry.

